

## Specification

## Title of the Invention

Information Search System Using Radio Portable Terminal

5 Background of the Invention

The present invention relates to a radio portable communication system and, more particularly, to an information search system for searching for information by using packet communication over a radio portable terminal.

In an information search system using packet communication over portable telephones, an operator selects a search word from search items displayed on the screen of a portable telephone or inputs a search word as characters by operating keys on the portable telephone and transmits the search word in a packet to an information provider. The information provider searches for information on the basis of the received search word, and then returns the found information to the portable telephone upon packeting it. The found information is displayed on the screen of the portable telephone.

As a system capable of easily searching for information, other than the above system using packet communication, an information search system using speech communication over portable telephones is available. In this information search system using speech

communication, an uttered search word is  
speech-recognized and information is searched out by the  
information provider on the basis of the recognized  
search word. Thereafter, the found information is  
5 converted into speech and returned to the portable  
telephone.

In the information search system using packet  
communication, however, when many search words are  
prepared, they cannot be displayed on the window of the  
10 portable telephone at once. For this reason, search  
items must be arranged in a tree structure and a search  
word must be selected while pictures on the screen are  
switched. However, it takes time to reach the target  
search word.

15 As another method of inputting a search word,  
a method of inputting a search word as characters by  
operating key buttons on a portable telephone is  
available. However, the keys on the portable telephone  
are small in size. In addition, since a plurality of  
20 characters are assigned to one key, cumbersome operation  
is required, and much time is required for the operation.

In the above information search system using  
speech communication, a search word can be easily input  
by speech over a portable telephone. However, a search  
25 result is returned by speech and is not recorded. In  
addition, image information cannot be returned to the  
portable telephone.

### Summary of the Invention

It is an object of the present invention to provide an information search system designed to improve the operability of a radio portable telephone in  
5 inputting an information search word/data.

It is another object of the present invention to provide an information search system which can recognize a search result in speech, image, and character.

10 In order to achieve the above objects,  
according to the present invention, there is provided an information search system comprising a radio portable terminal having a speech communication function and packet communication function, and a center for  
15 selectively performing speech communication and packet communication with the radio portable terminal, the center including speech control means for performing speech communication with the radio portable terminal during execution of packet communication by the radio  
20 portable terminal, speech recognition means for recognizing a speech signal received by the speech control means and sent from the radio portable terminal, information search means for searching for information on the basis of the speech information recognized by the  
25 speech recognition means, speech conversion means for converting the speech information of the information searched out by the information search means into a

speech signal and outputting the signal to the speech control means, the speech signal from the speech conversion means being transmitted to the radio portable terminal by the speech control means, and packet control means for transmitting image/character information of the information searched by the information search means to the radio portable terminal by packet communication.

#### Brief Description of the Drawings

Fig. 1 is a block diagram showing an information search system according to an embodiment of the present invention;

Fig. 2A is a front view of a radio portable terminal in Fig. 1;

Fig. 2B is a block diagram showing the main part of the radio portable terminal;

Fig. 3 is a view showing the correspondence between the self-station IP address of each radio portable terminal and a corresponding self-station speech communication address; and

Fig. 4 is a flow chart showing search operation performed by the information search system in Fig. 1.

#### Description of the Preferred Embodiment

The present invention will be described in detail below with reference to the accompanying drawings.

Fig. 1 shows an information search system according to an embodiment of the present invention.

The information search system of this embodiment is applied to a radio portable terminal communication system. The information search system shown in Fig. 1 is comprised of a radio portable terminal 10 having a speech communication function and packet communication function, a base station 20 for performing radio communication with the radio portable terminal 10, a center 30 to which the base station 20 is connected, the Internet 22 to which the center 30 is connected, and an article information file 21 connected to the Internet 22.

The center 30 is comprised of a speech control section 15 for controlling speech communication with the radio portable terminal 10 via the base station 20, a speech recognition section 16 for recognizing the speech received by the speech control section 15, an information search section 17 for searching for information in accordance with the recognition result obtained by the speech recognition section 16, a speech conversion section 18 for converting the search result (speech information) obtained by the information search section 17 into speech and outputting it to the speech control section 15, a packet control section 19 for controlling packet communication with the radio portable terminal 10 via the base station 20, and a communication control section 23 for switching between speech communication by the speech control section 15 and packet communication by the packet control section 19.

The speech control section 15 includes a table 24 storing the correspondence between the self-station IP (Internet Protocol) address of each portable terminal and a corresponding self-station speech communication address. The information search system of this embodiment has a calling number identification notifying function of automatically notifying a callee of the calling number of a caller. This calling number identification notifying function is a known function in the telephone communication field including radio portable terminal communication systems.

As shown in Fig. 2A, the radio portable terminal 10 has, on its panel surface, a packet communication → speech communication switch (to be referred to as a switch hereinafter) 1, a speech communication → packet communication switch (to be referred to as a switch hereinafter) 2, a microphone 13 to which speech is input, a speaker 11 for outputting a speech signal, a display screen 12 on which image/character information is displayed, and a key operation section 14 on which dial input operation or the like is performed.

As shown in Fig. 2B, the radio portable terminal 10 includes a radio section 4 for performing radio communication with the base station 20 via an antenna 3, a communication control section 5 which is connected to the radio section 4 to switch between

speech communication and packet communication, a speech communication section 6 for performing speech communication with the center 30 via the radio section 4 and base station 20, and a packet communication section 5 7 for performing packet communication with the center 30 via the communication control section 5, radio section 4, and base station 20. The speaker 11 and microphone 13 are connected to the speech communication section 6. The display screen 12 is connected to the packet 10 communication section 7. The communication control section 5, speech communication section 6, and packet communication section 7 perform communication switching and communication control in accordance with outputs from the switches 1 and 2 and the key operation section 15 14.

Fig. 3 shows an example of the data stored in the table 24. The table 24 is created by the following method. A user key-inputs the self-station speech communication address of the radio portable terminal 10 20 and transmits it to the center by packet communication. The center then obtains the relationship between the self-station IP address of the packet communication and the transmitted self-station speech communication address. The obtained relationship is stored in the 25 table 24 in advance as the relationship between the self-station IP address of the radio portable terminal 10 and the self-station speech communication address.

Search operation in the above information search system will be described next with reference to the flow chart of Fig. 4. Assume that the message "Please input a trade name" is displayed on the display screen 12 of the radio portable terminal 10 during packet communication to prompt the user to input a trade name, and the user searches an article information file on the Internet for information by speech-inputting information about the trade name "ABC" as a search keyword.

The user presses the switch 1 of the radio portable terminal 10 during packet communication between the packet communication section 7 of the radio portable terminal 10 and the packet control section 19 of the center 30, and then dials through the key operation section 14 to start speech communication with the center 30 via the base station 20 (step S1). At this time, communication paths are switched by the communication control sections 5 and 23, and speech communication is performed between the speech communication section 6 of the radio portable terminal 10 and the speech control section 15 of the center 30. At the same time when a speech communication path is established, the speech control section 15 of the center 30 looks up the center 30 to acquire a corresponding self-station IP address in accordance with the self-station speech communication address of the radio portable terminal 10 notified by



the calling number identification presentation function (step S2). The acquired self-station IP address is sent to the packet control section 19 and held therein.

When the user utters the trade name "ABC" toward the microphone 13, the speech input to the microphone 13 is received by the speech control section 15 of the center 30 via the speech communication path and output to the speech recognition section 16 (step S3). The speech recognition section 16 recognizes the speech output from the speech control section 15 (step S4) and outputs the recognition result "ABC" to the information search section 17. The information search section 17 performs a keyword search in accordance with the recognition result obtained by the speech recognition section 16 to acquire found information about the trade name "ABC" from the article information file 21 on the Internet (step S5).

The information search section 17 sends, to the speech conversion section 18, information of the found information about the trade name "ABC" which can be provided to the user by speech. The speech conversion section 18 converts the information from the information search section 17 into speech and sends it to the speech control section 15 (step S6). The speech control section 15 transmits the speech information about the trade name "ABC" to the radio portable terminal 10 via the speech communication path (step S7).

The radio portable terminal 10 receives the speech information about the trade name "ABC" from the center 30 through the speech communication section 6 and outputs it from the speaker 11.

5           The information search section 17 sends image/character information or the like which is associated with the trade name "ABC" and can be displayed on the screen to the packet control section 19. The packet control section 19 assembles the  
10 image/character information from the information search section 17 into a packet (step S8). When the user presses the switch 2 of the radio portable terminal 10 (step S9: YES), the packet control section 19 transmits the packet of the image/character information to the  
15 held IP address of the radio portable terminal 10 via a packet communication path (step S10). The radio portable terminal 10 receives the image/character information from the center 30 through the packet communication section 7 and displays it on the display  
20 screen 12.

In the embodiment described above, the user manually operates the switches 1 and 2 to switch packet communication and speech communication. However, the packet control section 19 or speech control section 15  
25 may automatically switch them in accordance with an instruction from a program.

Alternatively, the center 30 may designate, by

packet communication, the speech communication address of the center which is to be dialed for speech communication with respect to the radio portable terminal 10 during execution of packet communication by the radio portable terminal 10. In this case, the calling radio portable terminal 10 can be specified from a terminated speech communication address, and the IP address of the radio portable terminal 10 can be acquired.

10                   If a broadband communication network is used as an infrastructure, the present invention can be implemented even in a condition where packet communication and speech communication are concurrently started and continued without switching them in the process of communication. In this case, the positions and presence/absence of switches impose no limitations on the present invention.

As has been described above, according to the present invention, when the user needs to input data during packet communication using a portable terminal, search images/characters are displayed on the display screen of the portable terminal by uttering a search keyword toward the microphone of the portable terminal. This makes it possible to easily input information search words or data with many items by speech during packet communication, thus improving the operability of the portable terminal. In addition, the search

images/characters can be visually checked to improve the performance of the portable terminal.